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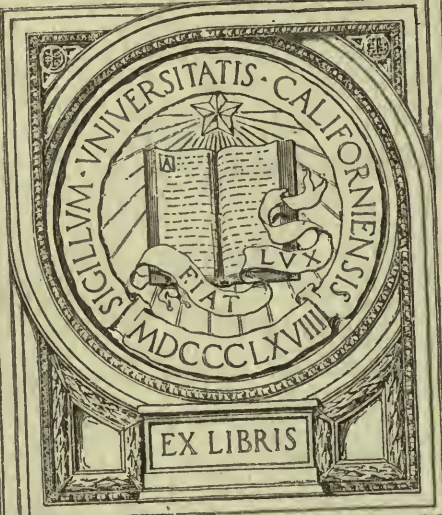
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ARITHMETIC BULLETIN No. 1.

Scientific Measurements of
Arithmetical Abilities in
Boston Public Schools.

JANUARY, 1914.

by
Rose A. Carrigan

AC



Compliments of Curtis Standard Tests.

CITY OF BOSTON
PRINTING DEPARTMENT
1914

The following statistics are the results of Curtis Standard Tests applied in thirty-five Boston Elementary School Districts. The tests were given and the computations made by senior students of the Boston Normal School; the scoring was done by the regular class teachers.

The work was organized and directed by

ROSE A. CARRIGAN.

J.P.

TO THE
 DIRECTOR
 BOSTON PUBLIC SCHOOLS

Total number of districts tested	35
Total number of buildings in which tests were given	72
Total number of classes tested	525
Grades tested:	
IV.	119
V.	118
VI.	112
VII.	108
VIII.	91
Pre-vocational, not classified	3
Ungraded, not classified	2
Total number of grades tested	553
Total number of children tested	20,646

TYPES OF EXAMPLES USED IN THE TEST.*

Addition (time allowed, 8 minutes)	572		
	253		
	948		
	529		
	936		
	223		
	358		
	676		
	122		
Subtraction (time allowed, 4 minutes)	121961783		
	90492726		
Multiplication (time allowed, 6 minutes),	7942	8736	6837
	72	502	680
Division (time allowed, 8 minutes)			49 2 8420

SERIES A, TEST 7, NOT RECORDED IN THIS BULLETIN.

* Curtis Standard Tests, Series B, used. Above examples taken from Form 1.

313645

GRADE STANDARDS FOR 1914.

Tentative Standards in Number of Examples * Attempted.

GRADES.	IV.	V.	VI.	VII.	VIII.
Test 1, Attempts.....	6	7	9	10	11
Test 2, Attempts.....	6	8	9	10	12
Test 3, Attempts.....	4	6	7	8	9
Test 4, Attempts.....	3	5	6	7	9

Established Standard in Number of Examples Right.

Accuracy 100% in all Tests.

NOTE.— Teachers are urged in every case to aim for 100%.

AVERAGE MEDIANS ATTAINED BY EACH GRADE IN THE 35 SCHOOL DISTRICTS TESTED.

GRADES.	IV.	V.	VI.	VII.	VIII.
Test 1, Attempts.....	5.8	7.1	8.5	9.6	11.2
Test 1, Rights.....	2.8	3.6	4.7	5.6	7.3
Test 2, Attempts.....	5.6	7.5	9.1	10.2	11.6
Test 2, Rights.....	2.7	4.5	6.5	7.3	8.7
Test 3, Attempts.....	4.2	5.7	6.9	8.1	9.4
Test 3, Rights.....	1.6	3.3	4.5	5.1	6.6
Test 4, Attempts.....	2.9	4.5	6.0	7.3	9.0
Test 4, Rights.....	.6	2.1	3.8	5.1	7.1

* In all the testing work the word "Attempts" is used to mean complete answers. A partial answer is not counted as an example attempted.

Ranges in the Class Medians † Attained in Each Grade.

GRADES.	IV.	V.	VI.	VII.	VIII.
Test 1, Attempts.....	* 3.6— 8.7	4.0—10.4	3.4—15.0	3.5—14.2	5.7—19.0
Test 1, Rights.....	.8— 7.0	1.3— 7.0	.5—11.0	1.4—11.0	4.0—11.4
Test 2, Attempts.....	3.7—10.8	3.8—10.3	5.0—12.3	6.0—16.0	5.5—21.8
Test 2, Rights.....	.5— 6.5	1.2— 8.2	3.0—10.3	3.8—14.3	3.0—17.3
Test 3, Attempts.....	1.6— 6.5	3.7— 8.4	4.9— 9.5	5.0—12.9	7.0—15.5
Test 3, Rights.....	.5— 3.8	.7— 5.4	2.0— 7.5	1.9— 9.2	2.3—10.8
Test 4, Attempts.....	.5— 6.0	1.9— 9.6	2.5— 9.7	4.2—10.5	3.6—15.0
Test 4, Rights.....	.5— 2.5	.5— 4.8	.8— 7.3	1.7— 9.0	1.6—12.7

* This means that the lowest class median in all the fourth grades tested was 3.6, while the highest class median in all the fourth grades tested reached 8.7. Notice the wide difference in median ability shown in the respective classes of each grade, for example, addition in the eighth grade.

† The median is the mid point of class achievement. Above it and below it are an equal number of individual scores.

Ranges in the Per Cents of * Variability.

GRADES.	IV.	V.	VI.	VII.	VIII.
Test 1, Attempts.....	11— 47	15—100	12— 41	10—40	10—37
Test 1, Rights.....	10—100	24—100	18—100	22—79	14—67
Test 2, Attempts.....	17—100	12—100	9— 64	10—38	8—43
Test 2, Rights.....	18—100	12—100	16— 96	15—75	18—78
Test 3, Attempts.....	24—100	16—100	11— 49	10—43	10—46
Test 3, Rights.....	13—100	12—100	17—100	17—91	18—75
Test 4, Attempts.....	26—100	19—100	18—100	12—84	12—57
Test 4, Rights.....	13—100	13—100	16—100	13—95	15—74

* Not more than 10% of variability in a class is considered desirable in this work on fundamentals. Defective children should be segregated. Individuals among normal children should be helped, when necessary, to overcome specific difficulties and all pupils should be led to feel responsible for bringing their own work up to the standards set for their grade.

CITY WIDE DISTRIBUTIONS.
Addition — Test I. Attempts.

Scores.	TOTAL NUMBER OF CHILDREN MAKING EACH SCORE.																									Totals.	
	0.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.		25.
Grade 4.....	11	59	227	440	945	778	799	513	317	191	91	36	13	22	11	7	3	2	2	1	1	1	1	1	1	1	4,472
Grade 5.....	7	8	43	185	431	573	785	676	640	349	271	156	88	47	36	28	18	7	8	2	5	2	1	1	1	1	4,367
Grade 6.....	3	9	21	75	202	370	547	603	664	515	394	261	158	92	80	47	38	24	13	9	8	2	3	3	2	2	4,143
Grade 7.....	6	6	18	36	127	202	347	412	615	526	456	291	217	163	124	89	82	33	37	14	12	10	4	2	8	8	3,837
Grade 8.....	2	2	.....	17	27	79	193	270	375	355	420	341	311	240	213	159	140	68	70	55	48	21	19	14	25	25	3,464
Totals.....	29	84	309	753	1,732	2,002	2,671	2,474	2,611	1,936	1,632	1,085	787	564	464	330	281	134	130	81	74	36	27	21	36	36	20,283
I. N. F.*	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	363
Grand Total.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	20,646

Scores.	PER CENT OF CHILDREN MAKING EACH SCORE.†																									Totals.	
	0.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.		25.
Grade 4.....	.2	1.3	5.1	9.8	21.1	17.4	17.9	11.5	7.1	4.3	2.1	.8	.3	.5	.2	.2	.04	.03	.02	.02	.02	.02	.02	.02	.02	.02	100%
Grade 5.....	.19	.2	1.0	4.2	9.9	13.1	17.9	15.5	14.7	8.0	6.2	3.6	2.0	1.1	.8	.6	.4	.19	.2	.04	.1	.04	.02	.02	.....	.....	100%
Grade 6.....	.07	.21	.5	1.8	4.9	8.9	13.3	14.6	16.1	12.4	9.5	6.3	3.8	2.2	1.9	1.1	.9	.6	.3	.2	.2	.04	.07	.07	.04	.....	100%
Grade 7.....	.2	.2	.5	.9	3.3	5.3	9.0	10.7	16.0	13.7	11.9	7.6	5.6	4.2	3.2	2.3	2.1	.9	1.0	.4	.3	.3	.1	.1	.2	.....	100%
Grade 8.....	.06	.06	.....	.5	.78	2.3	5.6	7.8	10.8	10.2	12.1	9.8	9.0	6.9	6.1	5.0	4.0	2.0	2.0	1.4	1.4	.6	.5	.4	.7	.....	100%
Totals.....	.14	.4	1.5	3.7	8.5	9.9	13.2	12.2	12.9	9.5	8.1	5.3	3.9	2.8	2.3	1.6	1.4	.7	.6	.4	.37	.18	.13	.11	.17	.....	100%

* I. N. F. Instructions not followed.
† I. N. F.'s not included.
Narrow distributions indicate good grading and effective teaching. Teachers are urged to aim for standard medians and narrow distributions.

CITY WIDE DISTRIBUTIONS.
Addition — Test I. Rights.

SCORES.	TOTAL NUMBER OF CHILDREN MAKING EACH SCORE.																									Totals.		
	0.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.		25.	
Grade 4.....	1,016	798	760	580	505	321	237	138	67	27	13	6	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	4,472
Grade 5.....	503	537	619	605	542	515	409	250	163	92	58	33	21	5	4	4	4	2	2	1	1	1	1	1	1	1	1	4,367
Grade 6.....	314	359	437	489	511	476	444	354	281	158	122	83	38	31	14	12	7	5	1	2	1	3	1	1	1	1	1	4,143
Grade 7.....	176	243	355	420	437	458	439	354	310	187	136	108	72	51	34	21	13	7	8	3	3	1	1	1	1	1	1	3,837
Grade 8.....	72	123	175	224	338	363	362	303	269	208	175	140	103	70	46	44	29	16	16	12	7	5	2	2	2	2	2	3,464
Totals...	2,081	2,060	2,346	2,318	2,833	2,133	1,801	1,458	1,124	733	537	405	272	191	123	84	68	43	25	22	16	10	6	3	1	1	1	20,283
I. N. F.*.....																												363
Grand Total.....																												20,646

SCORES.	PER CENT OF CHILDREN MAKING EACH SCORE.†																									Totals.		
	0.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.		25.	
Grade 4.....	22.8	17.8	17.0	12.9	11.3	7.2	5.3	3.1	1.5	.6	.3	.12	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	100%
Grade 5.....	11.5	12.3	14.2	13.8	12.4	11.8	9.4	5.7	3.7	2.1	1.3	.8	.5	.1	.1	.1	.1	.08	.08	.02	.02	.02	.02	.02	.02	.02	.02	100%
Grade 6.....	7.6	8.7	10.5	11.8	12.4	11.5	10.7	8.5	6.8	3.8	2.9	2.0	.9	.8	.3	.3	.2	.12	.02	.04	.02	.08	.02	.02	.02	.02	.02	100%
Grade 7.....	4.6	6.3	9.2	10.9	11.4	11.9	11.4	9.3	8.2	4.9	3.5	2.8	1.9	1.3	.9	.6	.3	.2	.2	.08	.08	.02	.02	.02	.02	.02	.02	100%
Grade 8.....	2.1	2.2	5.1	6.4	9.8	10.5	10.5	10.5	8.8	7.8	6.0	5.1	4.1	3.0	2.0	1.3	1.3	.8	.5	.5	.3	.2	.14	.06	.02	.02	.02	100%
Totals.....	10.3	10.2	11.6	11.4	11.5	10.5	9.3	7.2	5.5	3.6	2.7	2.0	1.4	.9	.6	.4	.3	.2	1.	1.	.1	.05	.03	.01	.01	.01	.01	100%

* I. N. F. Instructions not followed.

† I. N. F.'s not included.

CITY WIDE DISTRIBUTIONS.
Subtraction — Test II. Attempts.

SCORES.	TOTAL NUMBER OF CHILDREN MAKING EACH SCORE.																									Totals.	
	0.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.		25.
Grade 4.....	23	83	342	575	798	859	684	415	315	124	97	46	27	22	13	7	10	6	1	1	2	2	2	2	2	1	1
Grade 5.....	7	16	51	118	303	551	730	695	723	395	362	172	102	67	33	20	13	9	5	3	1	2	2	2	3	3	
Grade 6.....	5	2	14	34	91	249	450	540	701	524	570	350	236	150	90	53	46	27	28	6	10	4	2	1	6	6	
Grade 7.....	3	4	14	14	55	129	282	411	554	471	558	397	355	217	142	89	51	48	27	21	19	8	4	4	5	5	
Grade 8.....	.....	.....	1	10	20	53	92	180	340	368	486	409	357	290	213	122	138	76	78	38	52	27	13	7	34	34
Totals.....	35	104	412	751	1,267	1,841	2,238	2,241	2,633	1,882	2,073	1,374	1,077	746	491	291	258	166	139	68	84	41	21	12	49	49	
I. N. F.*.....	352
Grand Total.....	20,294
.....	20,646

SCORES.	PER CENT OF CHILDREN MAKING EACH SCORE.†																									Totals.
	0.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.		25.
Grade 4.....	.5	1.9	7.7	12.9	17.9	19.2	15.3	9.3	7.2	2.8	2.3	1.1	.6	.5	.3	.1	.2	.12	.02	.....	.04	.....	.....	.....	.02	.....
Grade 5.....	.2	.4	1.2	2.7	6.9	12.5	16.6	15.9	16.5	9.0	8.3	3.9	2.3	1.5	.75	.5	.29	.19	.11	.07	.....	.02	.05	.07	.....	.....
Grade 6.....	.12	.04	.3	.8	2.2	5.9	10.8	12.8	16.8	12.5	13.6	8.4	5.6	3.6	2.1	1.3	1.1	.7	.7	.13	.23	.09	.04	.02	.13	.....
Grade 7.....	.....	.1	.1	.4	1.4	3.4	7.3	10.7	14.3	12.2	14.4	10.3	9.2	5.4	3.7	2.3	1.3	1.3	.7	.5	.5	.2	.1	.1	.1	.....
Grade 8.....	.....	.....	.03	.3	.6	1.5	2.7	5.25	10.0	10.8	14.4	12.0	10.4	8.5	6.4	3.4	4.1	2.3	2.3	1.1	1.5	.82	.4	.2	1.0	.....
Totals.....	.2	.5	2.0	3.7	6.2	9.1	11.0	11.0	12.9	9.2	10.3	6.9	5.4	3.8	2.4	1.4	1.2	.8	.7	.3	.4	.2	.1	.06	.24	.....

* I. N. F. Instructions not followed.

† I. N. F.'s not included.

CITY WIDE DISTRIBUTIONS.
Subtraction — Test II. Rights.

Scores.	TOTAL NUMBER OF CHILDREN MAKING EACH SCORE.																									Totals.	
	0.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.		25.
Grade 4.....	1,280	666	607	539	492	397	224	122	57	27	20	7	5	2	3	1	1	1									4,450
Grade 5.....	460	382	389	486	537	558	527	409	247	172	103	62	18	10	8	4	7	1	1		2						4,383
Grade 6.....	198	215	237	352	387	470	549	453	441	301	247	133	77	49	28	21	8	15	3	3			1		1	4,189	
Grade 7.....	113	130	191	285	339	449	459	456	387	311	262	188	92	61	55	33	16	20	10	3	6	1			1	3,868	
Grade 8.....	42	64	93	134	197	271	339	348	361	339	320	251	176	136	96	70	49	39	23	20	13	11	3	3	6	3,404	
Totals....	2,093	1,457	1,517	1,796	1,952	2,145	2,098	1,788	1,493	1,150	952	641	368	258	190	129	81	75	37	26	21	12	4	3	8	20,294	
I. N. F.*.....																											352
Grand Total.....																											20,646

Scores.	PER CENT OF CHILDREN MAKING EACH SCORE.†																									Totals.	
	0.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.		25.
Grade 4.....	28.8	15.0	13.6	12.1	11.1	8.7	5.0	3.0	1.2	.5	.5	.2	.1	.06	.08	.03	.03										100%
Grade 5.....	10.5	8.7	8.9	11.1	12.3	12.7	12.0	9.3	5.6	3.9	2.4	1.4	.41	.23	.18	.09	.2	.02	.02		.05						100%
Grade 6.....	4.3	5.1	5.8	8.4	9.4	11.2	13.2	10.8	10.5	7.2	5.9	3.2	1.9	1.1	.7	.5	.2	.4	.08	.08					.02		100%
Grade 7.....	2.9	3.4	4.9	7.4	8.8	11.3	11.9	11.9	10.0	8.1	6.8	4.9	2.4	1.6	1.4	.88	.41	.51	.24	.07	.15	.02			.02		100%
Grade 8.....	1.2	1.8	2.7	3.9	5.7	8.0	10.1	10.3	10.6	10.1	9.4	7.4	5.2	3.9	2.7	2.1	1.4	1.1	.7	.6	.4	.3	.1	.1	.2		100%
Totals....	10.5	7.2	7.5	8.9	9.7	10.8	10.6	8.8	7.3	5.6	4.7	3.2	1.3	1.2	1.0	.5	.4	.3	.13	.12	.11	.06	.02	.02	.04		100%

* I. N. F. Instructions not followed.

† I. N. F.'s not included.

CITY WIDE DISTRIBUTIONS.
Multiplication — Test III. Attempts.

Scores.	TOTAL NUMBER OF CHILDREN MAKING EACH SCORE.																									Totals.		
	0.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.		25.	
Grade 4.....	184	323	892	971	852	595	308	151	90	62	19	18	9	9	2	7	3	2	3	2	2	7	1	4,510
Grade 5.....	34	59	229	388	564	823	900	593	358	168	99	44	15	22	5	7	2	1	1	.....	1	.....	.....	.....	2	1	4,316
Grade 6.....	7	14	72	192	327	669	857	663	500	374	283	110	52	30	22	18	7	4	3	1	2	2	3	.....	1	.....	4,213
Grade 7.....	4	3	29	79	168	432	666	618	576	456	357	248	134	60	35	29	15	8	6	.....	2	.....	.....	.....	.....	.....	3,925
Grade 8.....	.....	4	2	24	56	160	355	409	484	515	502	315	210	157	107	87	44	33	17	10	2	1	2	.....	1	1	3,498
Totals....	229	403	1,224	1,654	1,967	2,679	3,086	2,434	2,008	1,575	1,260	735	420	278	171	148	71	48	30	13	14	4	5	.....	4	2	20,462
I. N. F.*.....	184
Grand Total.....	20,646

Scores.	PER CENT OF CHILDREN MAKING EACH SCORE. †																									Totals.		
	0.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.		25.	
Grade 4.....	4.1	7.1	19.8	21.3	18.9	13.2	6.8	3.4	2.1	1.4	.4	.4	.2	.2	.05	.2	.07	.05	.07	.04	.2	.02	.....	.....	.....	.....	.....	100%
Grade 5.....	.7	1.4	5.3	9.0	13.1	19.1	20.8	13.8	8.3	3.9	2.3	1.0	.3	.5	.1	.2	.06	.02	.02	.....	.02	.....	.....	.....	.06	.02	.....	100%
Grade 6.....	.2	.3	1.7	4.7	7.8	15.9	20.3	15.7	11.9	8.9	6.7	2.5	1.2	.7	.5	.4	.2	.1	.07	.03	.05	.05	.07	.....	.03	.....	.....	100%
Grade 7.....	.1	.1	.7	1.9	4.3	11.2	17.1	15.7	14.7	11.6	9.1	6.3	3.4	1.5	.8	.6	.4	.2	.2	.....	.1	.....	.....	.....	.....	.....	.....	100%
Grade 8.....	.....	.1	.05	.7	1.6	4.6	10.0	11.7	13.8	14.7	14.4	9.0	6.3	4.5	3.1	2.5	1.3	.8	.4	.3	.04	.02	.05	.....	.02	.02	.....	100%
Totals....	1.1	1.9	5.9	7.9	9.6	13.8	15.8	11.4	9.8	7.6	6.1	3.5	2.0	1.3	.8	.7	.3	.2	.1	.06	.07	.02	.02	.....	.02	.01	.....	100%

* I. N. F. Instructions not followed.

† I. N. F.'s not included.

CITY WIDE DISTRIBUTIONS.
Multiplication — Test III. Rights.

SCORES.	TOTAL NUMBER OF CHILDREN MAKING EACH SCORE.																									Totals.	
	0.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.		25.
Grade 4.....	1,022	978	660	451	258	153	51	28	6	2	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4,510
Grade 5.....	744	548	651	736	658	466	270	126	71	27	13	5	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4,316
Grade 6.....	333	342	481	655	676	462	462	249	176	100	51	17	10	6	6	2	.....	1	.....	1	.....	.....	.....	.....	.....	.....	4,213
Grade 7.....	142	249	379	523	601	608	502	376	245	143	78	47	14	11	4	2	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	3,925
Grade 8.....	64	98	185	283	383	487	488	433	363	266	190	91	82	46	15	9	5	5	3	2	.....	.....	.....	.....	.....	.....	3,498
Totals.....	3,205	2,215	2,356	2,648	2,576	2,359	1,773	1,212	861	598	332	161	106	64	25	13	6	6	4	2	.....	.....	.....	.....	.....	.....	20,462
I. N. F.*	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	184
Grand Total.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	20,646

SCORES.	PER CENT OF CHILDREN MAKING EACH SCORE.†																									Totals.	
	0.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.		25.
Grade 4.....	42.6	21.7	14.7	10.0	5.7	3.4	1.1	.62	.11	.04	.....	.03	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	100%
Grade 5.....	17.2	12.9	15.0	17.0	15.3	10.8	6.2	2.9	1.64	.62	.3	.12	.....	.02	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	100%
Grade 6.....	7.9	8.2	11.4	15.6	16.0	15.4	11.0	5.9	4.2	2.3	1.2	.4	.2	.1	.1	.06	.....	.02	.02	.....	.....	.....	.....	.....	.....	.....	100%
Grade 7.....	3.8	6.3	9.7	13.6	15.0	15.4	12.8	9.02	6.5	4.02	2.0	1.2	.3	.22	.08	.04	.02	.....	.....	.....	.....	.....	.....	.....	.....	.....	100%
Grade 8.....	1.8	2.8	5.3	8.2	10.9	14.0	14.0	12.4	10.4	7.6	5.4	2.6	2.3	1.3	.4	.3	.1	.1	.06	.04	.....	.....	.....	.....	.....	.....	100%
Totals.....	15.9	10.9	11.6	13.1	12.7	11.7	8.3	5.9	4.4	2.4	1.2	.8	.5	.3	.12	.07	.04	.04	.02	.01	100%

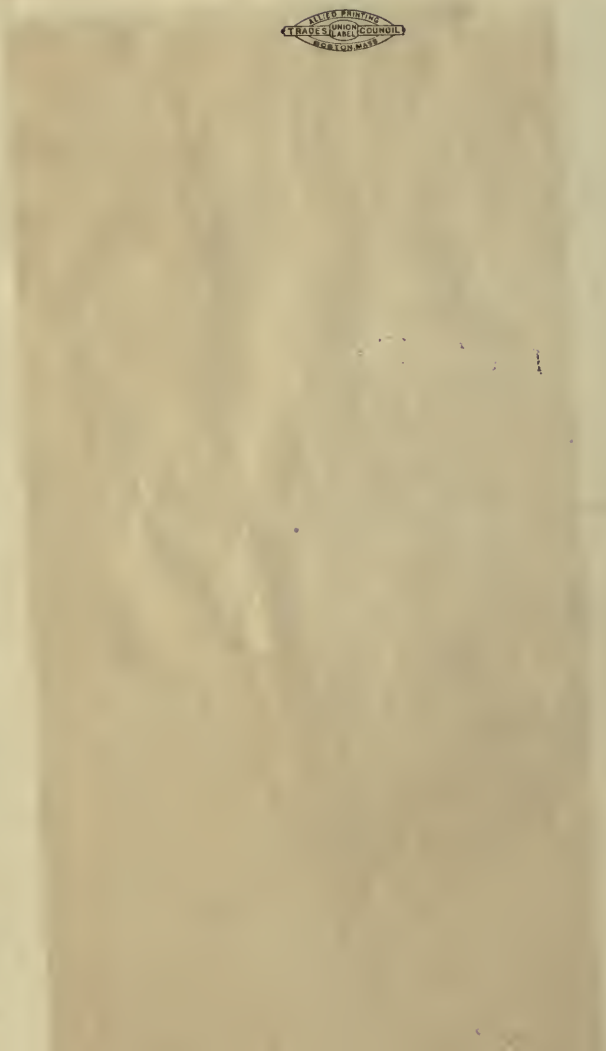
* I. N. F. Instructions not followed.

† I. N. F.'s not included.





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